

machines in the minimum laundry is primarily to provide a break-down service. Washing machines require repairs oftener than any other machines in the laundry and they are indispensable to the operation of the plant.

Water, Steam and Power Requirements

The minimum water, steam and power requirements are about 100 gal. of cold water, 80 gal. of hot water, 30 lb. of steam and 1 k.w. of electricity per 100 lb. of clothes (dry). The average laundry may exceed these as much as 50 per cent and small laundries may exceed this by as much as 100 per cent.

The instantaneous demands for steam and water are much higher than the average demands. Due to the heavy instantaneous demands, especially in a small laundry, it is well to supply the laundry from the main boiler plant, where these drafts will be least felt.

If an individual boiler is installed for the laundry, or for other reason the load curve must be flattened out, the use of larger tanks to obtain

TABLE 1. AVERAGE STEAM, WATER, AND POWER REQUIREMENTS OF WASHING MACHINES

SIZE OF WASHER	DRY CLOTHING PER CU. FT. OF CYLINDER CAPACITY, LB.	HOT WATER PER HOUR, GALLONS	HOT WATER TANK STORAGE, GALLONS	SIZE OF HOT AND COLD WATER CONNECTIONS, IN.	SIZE OF STEAM CONNECTIONS, IN.	ELECTRIC DEMAND, HP.
Small.....	2	150	100	1½	¾	2
Medium.....	2	200	150	2	1	4
Large.....	2	300	200	2	1	6
High Duty.....	4	600	400	2 (2)	1¼	8

more storage capacity is necessary. Tanks double the sizes given in Table 1, are frequently required. In estimating the hot water demand the laundry trays ordinarily may be neglected.

The hot and cold water connections to washers are from 1½ in. to 2 in., depending on size, with ¾ in. to 1 in. steam connections, without returns. The use of oily exhaust steam in washers is objectionable. With alternating current machines an allowance of 100 per cent must be made for reversing.

Ironers usually have steam-heated rolls, and steam pressures of from 70 lb. to 90 lb. are desirable. Occasionally, with light-work, a pressure of 50 lb. will suffice. Each roll of an average sized ironer should have a ¾-in. or 1-in. steam connection, with a ½-in. or ¾-in. trap. The electric motors for ironers are from ¾ to 2 hp., according to size. Electrically heated irons require from 500 to 1,000 watts, according to size.

Tumbler Dryers are rated on diameter and length of cylinder. Each has a small fan, which must have its outlet connected to an outside vent, as it discharges hot, damp air and considerable lint and refuse.

The average machine requires about 600 lb. of steam per hour, and takes an electric motor of from 3 to 6 hp.

The usual steam connection is from 1 to 1¼ in. with a ¾-in. return.

Extractors require from 2 to 5 hp. motors.

Other Laundry Equipment, steam and return services, average as follows:

UNIT	SUPPLY IN.	RETURN IN.
Dry rooms.....	¾	¾
Starch cookers.....	½	½
Garment presses.....	½	½
Disinfector.....	1	¾

Average water services are as follows:

UNIT	COLD WATER IN.	HOT WATER IN.
Soap tank.....	½	½
Starch cooker.....	½	½
Laundry trap.....	¾	¾

Importance of Soft Water

Soft water, the softer the better, is a necessity if a clean, white wash is to result. With hard water the soap forms insoluble compounds with calcium, magnesium and iron which cling to the washed fibres and after they have been through the flatwork ironer the spots turn various colors. In addition to this, more soap is required with hard waters than with soft; the excess depending upon the amount of hardness present. Before any lather is formed the soap must neutralize the hardness of the water. One pound of average soap will soften (bring to point of producing lather) 167 gal. of water when the hardness is 20 parts per million, but only 40 gal. when the hardness is 100 parts per million. Seventeen parts per million is equivalent to one grain of hardness, by weight, per gallon.

Equipment Arrangement

For efficient operation the arrangement of equipment must be given careful study so that it will fit in with the natural sequence of operations from receipt to delivery. Any backward movements of material that might involve possible contact of washed materials with unwashed material must be guarded against.

Whenever possible the laundry should be in a separate building. The ceilings of the building should be high and the rooms well ventilated by large windows and adequate roof ventilators. Ventilating fans will frequently be required.

All operations except receiving, mending, storing and delivering should be carried on in one room.

EQUIPMENT FOR KITCHENS

The equipment covered herein includes the equipment found in the ordinary institution or hotel kitchen. Nearly all of this equipment can be obtained for gas or for steam. For small kitchens where steam is not